

# ATPL

## AIR DRIVEN/ PNEUMATIC/ CONVENTIONAL ARTIFICIAL HORIZON

### Turning Errors in the Air Driven Artificial Horizon

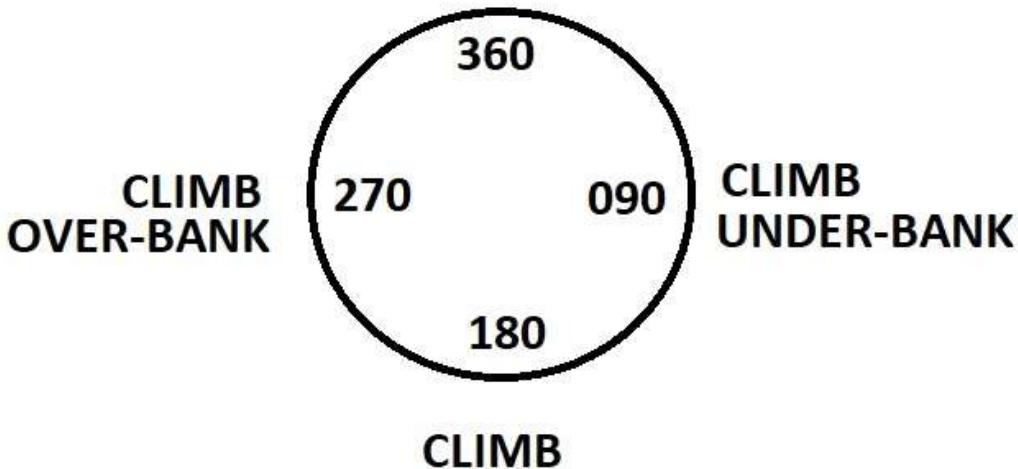
Whenever an aircraft turns there must be an acceleration towards the centre of the turn (centripetal force). Since the pendulous vanes are now affected by a horizontal acceleration as well as acceleration due to gravity, errors in pitch and roll indications will occur. During the turns the centrifugal force will act on the fore and aft pendulous vanes ('erection' error) and weighted base of the rotor housing ('pendulosity' error). The errors are complex and change as the turn progresses, cancelling out after a 360° turn. The magnitude of the errors varies with speed, rate of turn and type of horizon. For a chosen speed and rate of turn, the errors can be compensated for by tilting the top of the rotor axis slightly forward (for erection error) and slightly to the left (for pendulosity error).

However, in an uncorrected instrument the following errors will occur. (Assume a classic instrument - air driven with the gyro rotating anticlockwise when viewed from above).

Turning through 90°:	Under-reads bank angle	Pitch error – indicating a climb
Turning through 180°:	Bank angle correct	Pitch error – indicating a climb
Turning through 270°:	Over-reads bank angle	Pitch error – indicating a climb
Turning through 360°:	Bank angle correct	Pitch angle correct

The tilts are of the order of 2°. The setting of the horizon bar has to be similarly modified to indicate correctly in level flight. Small residual errors occur, particularly if the speed and rate of turn are not those for which compensation has been applied, but the errors are very much smaller than they would be had no compensation been made.

### AIR DRIVEN/ CONVENTIONAL AH TURNING ERROR



MNEMONIC: THE WEST IS JUST AN OVERPRICED  
CAPITALIST ECONOMY

---COLLATED BY SRINATH SARAN BHAUMIK---